Winemakers Dilemma - Part 3

It is time to look at the entire decision problem that Alejandro is facing. Again, before any modeling it was Alejandro's prior probability that the chance of a storm is 50%. If he harvests now, he will need to accept the current, but low, sugar levels. As this summer has been unusually warm, he also believes that if a storm occurs there will be favorable possibility to the development of botrytis mold (Noble Rot), he assigned a 10% belief in this outcome. However, if he waits to harvest and there is no storm the grapes will have an opportunity sweeten on their own. With no storm there are three things that might happen: no, typical, or high sugar level increases. Alejandro believes the likelihood of these three outcomes is 60%/30%/10%. The following table shows the type, market revenue for the winery, and quantity expected under these various conditions (there are 12 bottles of wine per case).

			Estimated Cases of Wine Produced					
Riesling Type	**Sweetness**	**Market Revenue Per Bottle**	**Harvest Now**	**Storm-No Mold**	**Storm-Mold**	**No Storm-No Sugar**	**No Storm-Typical Sugar**	**No Storm-High Sugar**
Trocken	dry	$ 5.00	6000	5000	5000	6000	5000	4000
Kabinett	off-dry	$ 10.00	2000	1000	1000	2000	1000	2500
Spätlese	sweet	$ 15.00	2000	0	0	2000	2500	2000
Auslese	sweeter	$ 30.00	0	0	0	0	1500	1000
Beerenauslese	very sweet	$ 40.00	0	0	0	0	0	500
Trockenbeerenauslese	super sweet	$ 120.00	0	0	2000	0	0	0

Complete the following tasks via a document write-up (no more than 3-pages). Include the link to your hosted application as the third task.

Task 1: Develop a graphical representation of this decision, complete with decision nodes, uncertainties, alternatives, likelihoods, and prospects. What is the value of clairvoyance? What is your recommended course of action?

Task 2: Incorporate your ML model from the last homework. Using the sensitivity and specificity of your model as a sensor update the decision model (graphically). What is the value of data? Does your recommended course of action change? At what model quality (sensitivity and specificity) are you indifferent to model development?

Task 3: Convert your decision model from task 2 into an MVP and host it using https://streamlit.io/ or https://gradio.app/ .

- App must display the e-value of the decision
- App must display the recommended alternative
- Have a user interface control that adjusts the following likelihoods and updates the e-value and recommended alternative
    - Chance of botrytis

- Chance of three sugar levels

Task 4: From an MLOps perspective, what systems would be required to maintain and improve this MVP? Include a discussion about topics relevant to product quality and considerations discussed in various classes.